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Solid-State Au/Hg Microelectrode for the Investigation of Fe and Mn Cycling in a Freshwater Wetland: Implications for Methane Production

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Titre	Solid-State Au/Hg Microelectrode for the Investigation of Fe and Mn Cycling in a Freshwater Wetland: Implications for Methane Production
Type de publication	Article de revue
Auteur	Ma, Shufen [1], Luther III, George W. [2], Keller, Jason [3], Madison, Andrew S [4], Metzger, Édouard [5], Emerson, David [6], J. Megonigal, Patrick [7]
Editeur	Wiley-VCH Verlag
Type	Article scientifique dans une revue à comité de lecture
Année	2008
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Titre de la revue	Electroanalysis
Résumé en anglais	The solid-state voltammetric gold-amalgam microelectrode was used to measure multiple redox species (O, S, Fe and Mn) in situ at (sub)millimeter vertical resolution to elucidate rhizosphere processes in Jug Bay wetlands. In vegetated soil, a classic diagenetic redox sequence without any dissolved sulfide was observed in summer. However, the rhizosphere can be quite variable which is due to the introduction of O2 to the anoxic sediments by plants. In nonvegetated soil, the vertical concentration–depth profiles were relatively constant. The presence of Fe(II), Mn(II) and soluble Fe(III) in deeper sediments indicates the oxidation of Fe(II) as well as the nonreductive dissolution of Fe(III) and the reductive dissolution of Fe(III) and Mn(III, IV) solids. Mn(III, IV) and Fe(III) redox chemistry is important in organic matter mineralization mediated by bacteria and in suppressing methane formation. In addition, Mn(III, IV) also can oxidize Fe(II) to supply Fe(III) for bacterial Fe(III) reduction. Studying Fe and Mn cycling via voltammetric methods can give insights to methane production and loss as there is no methane sensor for sediment work at present.
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